WHAT IS CLAIMED IS:

1. A mechanical pump for use in a medical device comprising:

an elongate hollow, flexible inner tube having a proximal end, a distal end, and a central lumen; and

a first coiled rotor element having a distal end and a proximal end disposed over an outer surface of the inner tube; and

a jacket securing the coiled rotor element to the outer surface of the inner tube.

2. A mechanical pump as in claim 1, wherein the inner tube has an outer diameter in the range from 0.5 mm to 5 mm, and the coiled rotor has a pitch in the range from 1 to 50 turns/cm.

3. A mechanical pump as in claim 1, further comprising a second coiled rotor element disposed over an inner surface of the central lumen of the inner tube.

4. A mechanical pump as in claim 3, wherein the first and second coiled rotors are counterwound.

5. A mechanical pump as in claim 3, wherein the first and second coiled rotors are co-wound.

6. A mechanical pump as in claim 5, wherein a distal portion of the coiled rotor is unattached to the inner tube to provide a whip element as the pump is rotated.

7. A mechanical pump as in claim 1, wherein the inner tube comprises a braided tube, a mesh tube, a coil, a stacked coil, or a coil-reinforced polymer tube.

8. A mechanical pump as in claim 7, wherein the coiled rotor element comprises a single filament, a multi-filar, stacked filaments, or multiple filament cable.

9. A mechanical pump as in claim 8, wherein the filaments comprise a round wire, a ribbon wire, or a wire having an irregular cross-section.

10. A method of making a mechanical pump for use in a medical device said method comprising:

providing a hollow flexible tube;

placing a resilient coiled rotor over an outer surface of said tube; and

forming a jacket over at least a portion of the outer surface of said tube and said coiled rotor, whereby the coiled rotor is secured to the outer surface of the flexible tube.

11. A method as in claim 10, wherein placing the coil comprises winding said coil over the surface.

12. A method as in claim 10, wherein placing the coil comprises unwinding the coil to increase its diameter and allowing the coil to rewind over the surface to provide an interference fit.

13. A method as in claim 10, wherein the jacket comprises a heat shrinkable polymer, wherein forming the jacket comprises heat shrinking the jacket over the inner tube and the coiled rotor.

14. A method as in claim 10, wherein forming the jacket comprises dipping the inner tube and rotor into a resin coating and curing the resin to form the jacket.

15. A method as in claim 10, wherein forming the jacket comprises bonding the coiled rotor to the inner tube.

16. A method as in claim 10, wherein forming the jacket comprises heating the coiled rotor and embedding it into the inner tube.

17. A method as in claim 10, wherein the inner tube comprises a braided tube, a mesh tube, a coil, a stacked coil, or a coil-reinforced polymer tube.

18. A method as in claim 17, wherein the coiled rotor element comprises a single filament, a multi-filar, a stacked coil, or a multiple filament cable.

19. A method as in claim 17, wherein said filaments comprise a round wire, a ribbon wire, or a wire having an irregular cross-section.

20. A method as in claim 17, wherein the flexible tube and the jacket both comprise polymers and wherein the method comprises bonding the tube to the jacket.

21. A method as in claim 17, wherein forming the jacket comprises spraying a polymer over the inner tube and coiled rotor.

22. A method of making a mechanical pump for use in a medical device, said method comprising:

providing a hollow flexible tube; and

forming a helical channel in an outer surface of the tube.

23. A circulation catheter comprising:

a catheter body having a proximal end, a distal end, and a lumen therebetween, the lumen forming a distal opening at the distal end of the catheter body;

an impeller rotatably disposed in the lumen of the catheter body to aspirate materials from the distal end to the proximal end of the catheter body; and

a clearing element disposed at the distal opening of the catheter body to prevent the materials from accumulating at the distal opening.

24 . A circulation catheter as in claim 23, further comprising a material capture device disposed at the distal end of the catheter body.

25. A circulation catheter as in claim 24, wherein the material capture device comprises a macerator.

26. A circulation catheter as in claim 25, further comprising an expansible cage surrounding the macerator.

27. A circulation catheter as in claim 26, wherein the macerator is configured to engage at least a portion of the expansible cage.

28. A circulation catheter as in claim 25, the impeller comprising a helical rotor having a distal end and a proximal end extending at least partially over an outer surface of a shaft, wherein a distal portion of the shaft extends beyond the distal opening of the catheter body.

29. A circulation catheter as in claim 28, wherein the macerator comprises a distal end and a proximal end, and wherein the distal end of the macerator is fixed to the distal end of the shaft, and wherein the proximal end of the macerator extends into the distal opening of the catheter body to form the clearing element.

30. A circulation catheter as in claim 28, wherein the rotor comprises a helical coil, and wherein the distal end of the helical coil is unattached to the shaft to form the clearing element.

31. A circulation catheter as in claim 28, wherein the clearing element comprises a cutting member coupled to the impeller at or near the distal opening.

32. A circulation catheter as in claim 31, wherein the cutting member is attached to the macerator.

33 . A circulation catheter as in claim 31, wherein the cutting member is attached to the shaft.

34. A circulation catheter as in claim 31, wherein the cutting member is attached to the helical rotor.

35. A circulation catheter as in any of claims 29-31, wherein the shaft is rotated to induce aspiration through the catheter body lumen, and wherein the clearing element spins relative to the catheter body to clear the distal opening of the catheter body as the shaft is rotated.

36. A method for transporting materials between a target site in a body lumen, and a location external to the patient, said method comprising:

introducing a distal end of a catheter to the target site;

rotating an impeller within a lumen of the catheter to aspirate material from the target site; and

clearing an opening of the lumen at the distal end of the catheter body to prevent the material from accumulating at the opening.

37. A method as in claim 36, wherein clearing the opening comprises rotating a clearing element inside the distal opening of the catheter body.

38. A method as in claim 37, the impeller further comprising a shaft and a helical rotor, wherein rotating the impeller further comprises rotating a macerator attached at a distal end of the impeller shaft.

39. A method as in claim 38, wherein clearing the opening of the lumen comprises spinning a proximal end of the macerator inside the distal opening of the catheter body.

40. A method as in claim 38, wherein the clearing element is coupled to the impeller, and wherein clearing the opening of the lumen comprises spinning the clearing element inside the distal opening of catheter body as the impeller is rotated.

41. A method as in claim 40, wherein the clearing element comprises a cutting disk attached to the shaft of the impeller.

42. A method as in claim 40, wherein the clearing element comprises a cutting disk attached to the rotor of the impeller.

43. A method as in claim 40, wherein the clearing element comprises a cutting disk attached to the proximal end of the macerator.